

Chapter 9

VEGETATIVE AND REPRODUCTIVE PROPAGATION METHODS IN VEGETABLE CROPS

OBJECTIVES

After studying this unit, you will be able to understand:

- Different methods of propagation in vegetable crops
- Vegetables propagated through sexual means
- Vegetables propagated through vegetative/asexual methods

INTRODUCTION

We grow different kinds of vegetables. There are different methods of raising these vegetables. Some are directly propagated through seeds and many others are raised through different vegetative parts of the plant. Have you ever tried to know how different vegetables grow? Which vegetable is raised through seed or other plant parts? At what stage, vegetative part can be planted and how is it prepared for growing? This chapter will make you aware about different propagating methods which are employed to raise different vegetable crops.

What we mean by plant propagation?

Plant propagation is the process of creating new plants from a variety of sources. For example, seeds, cuttings, rhizomes, tubers, bulbs and other plant parts. There are, in general, two methods of plant propagation.

1. Reproductive or Sexual propagation (seed)
2. Asexual propagation

1. **Sexual Propagation:** It refers to the use of seed or spore that is separated from the parent plant. This method is known as sexual because there is a contribution of both the male and female gametes in the production of new plants. A plant grown from seeds may have different characteristics from its parents.

Advantages

- It is usually the only method of producing new varieties or cultivars.
- It is often the cheapest and easiest method of producing large number of plants.



- It can be done to avoid certain diseases.
- It may be the only way to propagate some species.

Disadvantages

- Plant characteristics are not genetically true to type to that of their mother plant.

Methods of reproductive propagation: There are two methods of propagation of vegetables through seed. These include

- i) **Direct method:** The seed is directly sown in the field for raising new plants. For example pea, beans, okra (*bhindi*), radish, turnip, carrot *etc.*
- ii) **Indirect method:** The vegetable crops whose seed is very small are first sown in the nursery and then seedlings after attaining appropriate growth are transplanted in the main field. This method is also called transplanting of seedlings. For example tomato, brinjal, bell pepper, cauliflower, cabbage and onion *etc.*

Asexual propagation: It is a process where a plant can reproduce asexually, with the use of a vegetative part of the original plant. This process can occur naturally and can also be done manually. Vegetative propagation results in the production of clones that are genetically identical to the parent plant and can be used to reproduce plants that are difficult or impossible to reproduce from seed.

Advantages

- Only one parent is required in this process, unlike sexual reproduction methods involving male and female parents.
- It is faster means of propagation.
- This process of propagation is especially beneficial to horticulturists and agriculturists, as they can raise various fruits and vegetable plants without any requirement to buy seeds.
- With modern techniques of tissue culture, one can grow virus free plants.
- The offsprings produced are generally identical and thus more beneficial characteristics can be preserved.

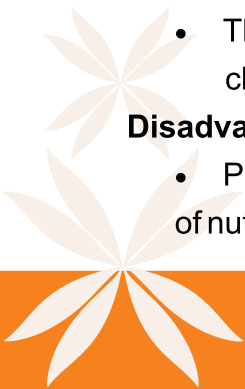
Disadvantages:

- Production of too many plants may lead to overcrowding which also results in lack of nutrients.



Chow-chow (*Sechium edule*) is an exceptional vegetable crop which is propagated through fruit

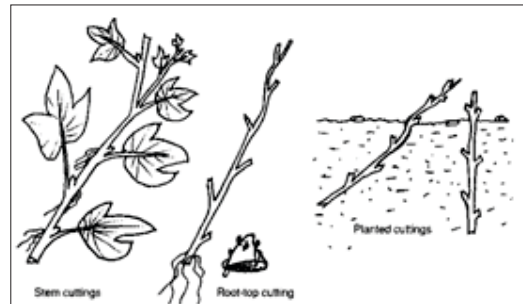
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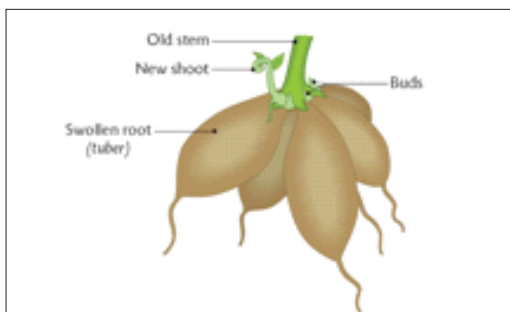
- Plants produced by vegetative means are more prone to diseases which are specific to the species of the plant.

Methods of vegetative propagation: Many methods are used for propagation, some of the commonly used techniques in vegetables are as under:

1. Stem cuttings: Cuttings are the part of plant that is cut off from the parent plant. Shoots with leaves attached are usually used. New roots and leaves grow from these cuttings. The shoot is cut at an angle. A growth promoter may be used to enhance the growth of the roots. Example, Sweet potato, cassava, tapioca, ivy gourd (*Kundru*) and perennial moringa.



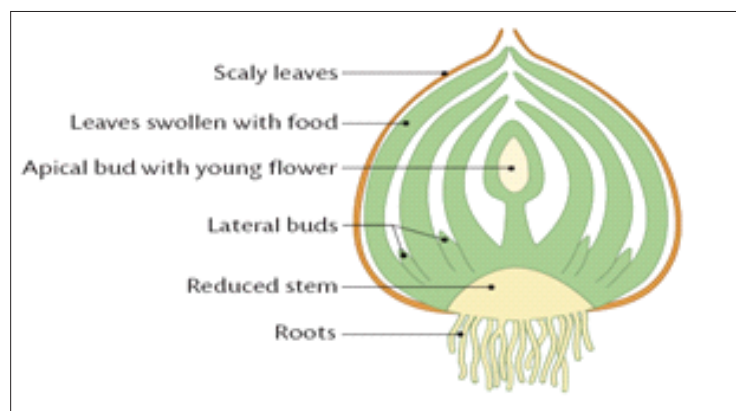
Stem cutting in sweet potato
Source: www.fao.org



Stolons
Source: leavingbio.net

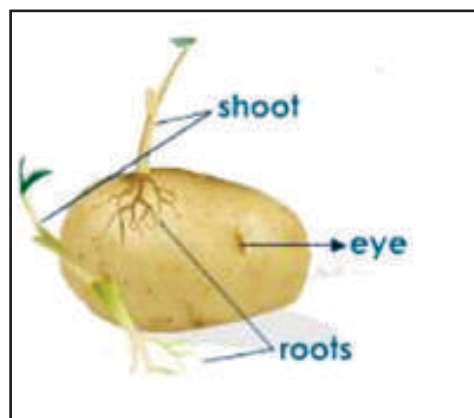
2. Stolons: Stolons or runners are the stems which grow underground to form new plants at the end of the nodes. These are stems that grow just under the ground, these runners have the capacity of producing new clones of the same plant from the buds at the tips. The stolons can be cut, and then planted as individual plants.

3. Bulbs: A bulb is an underground storage organ formed from the plant stem and leaves. The leaves contain much stored food. At the centre of the bulb is an **apical bud**. Also attached are **lateral buds**. The apical bud produces leaves and a flower, while the lateral buds produce new shoots. As the plant grows and develops, it forms a new bulb underground.



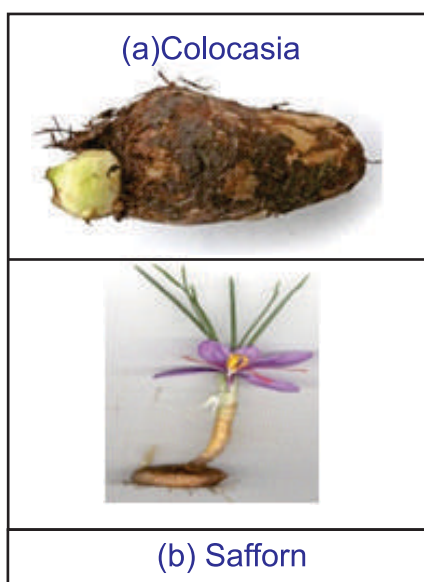
Onion bulb
Source: leavingbio.net

4. Tubers: Potato and Jerusalem Artichoke both have tubers. A tuber has an apical and many axillary buds all over its surface. A tuber is a fleshy storage organ formed from either a stem or root. Some plants form tubers on their roots such as sweet potato (*Sakarkand*) which are used for storing food. A potato tuber is formed at the end of the underground stem, and can produce new shoots from eyes or buds on its surface. During the growing season, the plant uses the food stored in the fleshy tuber, and new tubers are formed.



Potato tuber

Source: www.tutorvista.com



5. Corms: A corm is an underground storage organ formed from the plant stem. It is a mass of solid tissue, without separate fleshy scales. It has a dry papery covering formed of modified leaves. A corm is formed from the swollen base of the stem, and roots form on the underside of the corm. Buds form at the top of the stem. During the growing season, the plant uses the food stored in the fleshy stem. At the end of the season, the leaves divert food to produce a new corm on top of the old one. Examples are colocasia (*Arbi*), elephant foot yam (*Suran/Jimmikand*) and saffron (*Kesar*).

6. Rhizomes: Ginger, turmeric and large cardamom form rhizomes. A rhizome is a swollen stem bearing leaves and roots. It grows horizontally on or just below the surface. A rhizome may be propagated by division, where growth from the ends produce leaves for a new plant.



Turmeric and Ginger rhizomes:

7. Micropropagation/Tissue Culture: This method is practiced to multiply a stock plant at a rapid rate, to produce a large number of progeny plants using the modern plant culture methods in the laboratory. Such plants are virus free thus more healthy. For example, potato, sweet potato, cassava *etc.*

8. Grafting: This method of plant grafting is used for inserting a piece of stem with buds (scion) into the stock. The types of grafting are whip grafting, cleft grafting, bark grafting, green grafting, T-budding, inverted T-budding and chip budding. Its use in vegetables is restricted *e.g.* disease resistant wild species of different vegetables can be used as a root stock to graft cultivated otherwise susceptible varieties of that particular crop.

9. Layering: Air or ground layering technique is done by using a portion of an aerial stem, growing roots while it is still attached to the parent plant, and then this plant is detached and grown as an independent plant. Example is sweet potato.

Main vegetable crops and plant parts used for their propagation

S.No.	Crop	Plant part for regeneration
1	Potato	Underground stem tuber
2	Sweet potato	Underground root tuber and above ground vines
3	Elephant foot yam	Corm , corm pieces and cormel
4	Taro/Colocasia	Cormel
5	Garlic	Clove (bulblet), bulbil
6	Pointed gourd	Vine cutting
7	Spine gourd	Fleshy root
8	Cassava	Stem cutting
9	Drumstick/Moringa	Limb cutting
10	Jerusalem artichoke	Root tuber
11	Globe artichoke	Root suckers or off shoots and division of old crown
12	Yam	Pieces of stem tubers and vine cuttings
13	Rhubarb	Division of crowns

Activity 1

Procure some tubers of potato and seeds of pea. Grow them in different pots/small beds. Then, see their growth pattern and write your experience.

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Check your progress

Write the method of propagation of following crops:

1. Tomato
2. Ginger
3. Potato
4. Onion
5. Saffron

Match the followings:

- | | |
|----------------|----------------|
| 1 Stem cutting | A Sweet potato |
| 2 Root tuber | B Turmeric |
| 3 Rhizomes | C Garlic |
| 4 Limb cutting | D Cassava |
| 5 Cloves | E Moringa |

Long answers:

1. Differentiate between sexual and asexual methods of propagation. What are their advantages and disadvantages?
2. Enlist different methods of vegetative propagation and give one example of each where these can be employed?

